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ABSTRACT

This paper reports some of the results of an evaluation of Project OCEAN (Oceanic Classroom Education and Networking), a teacher training and curriculum reform project. The paper focuses on results that suggest that Project OCEAN was able to stimulate important collegial behaviors among teachers in all participating schools, and attempts to identify features of the project that might be responsible for these results. Indices of participation and teachers' willingness and confidence to teach marine science show that the project was indeed implemented. In addition to affecting the science curriculum, the project brought about changes in school climate, improving a participating school's potential for continuing improvement. It may be that important steps toward reform, such as beginning to establish a norm of collegiality, can be initiated by agencies outside the school, when schools are voluntary participants. (MVL)

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The Effects of a Marine Science Curriculum and Training Project on Collegiality

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The Effects of a Marine Science Curriculum and Training Project on Collegiality

Many school districts undoubtedly want to rise to the demand for improved science instruction, yet it is not a simple matter to bring about such improvement. Numerous factors come into play: schools may not have the resources to purchase new materials, invest in curriculum revision, or support teachers' continuing professional development. There may be lack of concordance among staff, administration and school board on what qualifies as improvement. Some schools are more likely than others to be successful innovators, however, because of the nature of their organizational norms (Bird & Little, 1986; Rosenholtz, Bassler, & Hoover-Dempsey, 1986; Talbert, 1987).

Schools whose organizational norms include opportunities for collegial interaction among the staff are in a better position to bring about improvement than those where collegiality is not supported. The most important resource for improvement, say some theorists, is time with colleagues (Bird & Little, 1986). In an ideal situation, teachers would share their accumulated knowledge with each other, but in most schools there are few mechanisms for bringing about this sharing, along with a general lack of commitment to allocate the time necessary. Teachers tend to be isolated, preparing and carrying out instruction autonomously, rarely having occasion to exchange substantive information about teaching with each other. Consequently, a major potential source of continuous improvement -- the pool of knowledge collectively held by a staff -- remains largely untapped.

Collegiality is a dynamic aspect of school climate (the overall environmental quality of an organization) that contributes to the development of a professional milieu. Coming from the Latin "collegium," meaning "community," collegiality implies shared decision making, cooperative teacher-teacher relationships, a team emphasis rather than individual competition, and clear goals (Anderson, 1982). It has been described as a measure of "peer cohesion of employees and the esprit de corps of the group as a whole" (Jorde-Bloom 1988). In truly collegial settings which foster professional development, teachers engage in frequent discussions about instruction; they research, evaluate and prepare materials together; and their teaching is public: they observe and critique each other. These collegial behaviors should be school-wide, continual, focused on practice, and inclusive of all faculty (Little, 1982). There must also be the time and resources to support these activities (Nelson, 1986; Wildman & Niles, 1987). Up to now, there have been no prescriptions for bringing about collegiality, although the norm of collegiality in a school is often a consequence of the leadership of a principal who provides frequent opportunities for teachers to interact around a task (Rosenholtz, Bassler, and Hoover-Dempsey, 1986), such as curriculum development.

In this paper we report some of the results of an evaluation of Project OCEAN (Oceanic Classroom Education and Networking), a teacher training and curriculum reform project. We focus on results that suggest that Project OCEAN was able to stimulate important collegial behaviors among teachers in all participating schools, and we attempt to identify features of the Project that might be responsible for these results. We specifically investigated this issue in the second year of the project, after informally identifying the phenomenon during the first year's evaluation of the project (Estrin, Lash, and Hotz-Steenhoven, 1987).

Indices of participation and teachers' willingness and confidence to teach marine science show that the project was indeed implemented. We find it of particular interest that in addition to affecting the science curriculum, the project brought about changes in an aspect of school climate-- one that is associated with a school's potential for continuing improvement. That such changes were induced from the outside via a curriculum reform project would not be predicted by the prevailing wisdom. It is true that schools have been called upon to cooperate with community resources (including business and institutions of higher learning) to improve instructional opportunities and promote professional development (e.g., Nelson, 1986), but most relevant research has shown that it is the school and its teachers who must take the lead in generating goals for change, if a reform effort is to be effective (Fenstermacher & Berliner, 1985; Berman & McLaughlin, 1978). The results of Project OCEAN suggest that this may not be uniformly true. It may be that important steps toward reform, such as beginning to establish a norm of collegiality, can be initiated by agencies outside the school, when schools are voluntary participants in those steps.

Methods

The Curriculum Project

Project OCEAN is a teacher-training and curriculum reform program which uses marine science as the theme for an interdisciplinary systems approach to science education. The Project's goal is to improve science education for all students by training teachers in a systems approach to science, in knowledge of marine science content, and in effective teaching

techniques. In addition, the program provides a full-fledged marine science curriculum which teachers can adapt and expand for their own classrooms.

Model of Student Instruction. Project OCEAN has incorporated several design ingredients in its model of student instruction. Among these are: a) school-wide participation, b) total school-day immersion in marine science, c) interdisciplinary teaching (with marine science as a theme), d) a systems approach to science that integrates concepts from biological science, physical science, and human interaction with the environment, e) use of cooperative learning and other instructional techniques, and f) inclusion of all students, and along with that, adaptation of the curriculum as necessary.

An important instructional component of Project OCEAN is Oceans Week, a one-week, schoolwide immersion program in marine science. During this week, marine science is used as a theme through which all aspects of science and other subjects are integrated. Each grade focuses on a particular marine habitat (open ocean, rocky intertidal, mudflats, e.g.), for which there is a curriculum guide. Classroom instruction is complemented by academic field trips and outside presentations related to marine science. Whereas teachers who participate in Project OCEAN may teach marine science at various times of the school year, Oceans Week is the designated time during which the study of marine science becomes a schoolwide experience: all students and all teachers in a school participate. Most, if not all, of each day during Oceans Week is devoted to the study of marine science.

Model of Teacher Training. Key design features of the teacher training model are a) description and modeling of marine science instruction, using specified techniques, b) opportunity for extended rehearsal by

teachers of marine science instructional activities using specified techniques, c) in-service training by Project OCEAN trained teachers of fellow teachers following the training, d) continuing consultation by Project OCEAN staff during the school year. These features reprise essential elements of good training described in the literature (Joyce & Showers, 1983, e.g.).

Project OCEAN takes a small number of teachers from each school through intensive training. One teacher per school participates in a 10-day Summer Institute and a 4-day Fall Workshop; three to four additional teachers from each school attend the 4-day workshop. These teachers all go on to conduct in-service training for their total school staffs. In this way, teachers are helped to train and support other teachers within their schools and have considerable responsibility for bringing about the instructional change. During training, teachers are themselves immersed in marine science study --via lectures, hands-on participation in the activities they will be doing with their students, presentations by experts outside of Project OCEAN, and field trips to various marine habitats.

Project OCEAN staff describe and model for teachers both the instructional activities and the techniques for teaching them (cooperative learning groups, hands-on participation, e.g.). Project OCEAN staff are expert in marine science and instruction. Teachers have the opportunity to practice virtually all of the activities taught. After the training period, continuing support from Project OCEAN staff is available to the teachers on an as-needed consulting basis. Designation of site coordinators who will be principal liaisons with Project OCEAN staff after training is meant to facilitate this relationship.

Curriculum Materials. Five curriculum guides, each organized around a marine habitat, are used by elementary teachers; same grade teachers teach

about the same habitat. The habitats are: Rocky Intertidal, Mudflats, Kelp Forest, Sandy Beach, and Open Ocean. (Two new habitat guides have been developed this year, but these five were used by the schools reported on here.) Teachers are given a Field Trip Guide and also have access to the large marine science library and marine artifacts owned by the Oceanic Society. During the summer training, teachers particicipate in reviewing and discussing selected marine science curricula and materials (owned by Project OCEAN) in addition to the Habitat Guides provided by Project OCEAN.

Evaluation Methods

The Schools. Seven elementary schools took part in the Project OCEAN evaluation during in the spring of 1988; three of these were in San Francisco, CA, one in Berkeley, CA, and three in Reno, NV. The schools ranged in size from one of 250 pupils and 13 teachers to one of 670 pupils and 26 teachers. With one exception, schools were of lower-middle socioeconomic status.

Data Collection. Multiple instruments were used. In each school structured, individual interviews were conducted with at least one-third of the faculty and the principal, a total of 58 teachers and 7 principals. The 30-45 minute interviews, which were tape-recorded for later transcription, focused on the level of participation and the nature of instruction during Oceans Week.

The entire faculty at each school was surveyed by questionnaire; information was gathered about amount of time devoted to marine science instruction and various facets of teachers' cooperation during Oceans Week. A minimum of two-thirds of the faculty of each school returned completed questionnaires, a total of 94. In this paper, we concentrate on responses to questions about effects of the Project on teachers'

collegiality, which we framed in terms of cooperation among teachers. We also document responses regarding levels of participation in Oceans Week, increase in science taught, and teachers' confidence about teaching marine science, as indices of the project's degree of implementation. Details of the full evaluation are reported by Estrin, Strang, and Tyler, (1988).

Results

Evaluation results show that participation in Oceans Week was high and that teachers reported an increase in amount of science taught and degree of confidence among about teaching marine science.

Level of Participation. All principals reported that their entire faculty, with the exception of at most one or two teachers participated in Oceans Week. Seventy per cent of teachers responding claimed that they had devoted 80-100% of available time to such instruction during Oceans Week. Another 17% spent 50-80% on marine science instruction. Seventy-nine per cent of teachers participating in Project OCEAN increased in confidence about teaching marine science, from the time before Oceans Week to after Oceans Week.

Collegiality. An overwhelming number of teachers claimed that during their involvement with Project OCEAN they had engaged in collegial behaviors more than usual (Table 1). Eight-five per cent of respondents shared materials more than usual; 87% shared ideas more than usual; and 80% claimed to have planned instruction with other teachers more than usual. Eighty-six per cent of teachers also claimed to have worked with people they do not normally work with: 33% worked more with same grade teachers, 70% worked more with other grade teachers, and 28% worked more with specialists.

We asked teachers to offer their own examples of cooperation, and 80% responding to questionnaires did. The most frequent example alluded to

Table 1

Teachers' Responses to Questions about Collegial Behaviors

Questionnaire Item	% of Teachers Who Said "More"
Compared to an average week, during Project OCEAN I found that I shared materials [less, about the same, more].	85
Compared to an average week, during Project OCEAN I found that I shared ideas [less, about the same, more].	87
Compared to an average week, during Project OCEAN I found that I planned instruction with other teachers [less, about the same, more].	80
During Project OCEAN did you find yourself working with people you normally do not work with?	% of Teachers Who Said "Yes"
-same grade teachers	33
-other grade teachers	70
-specialists	28

some aspect of joint instructional planning (35%).

> The fifth grade teachers each chose one area to teach to all fifth grade students. They planned and shared the actual teaching; and teachers rotated through classes.
>
> K-5 Resource Teacher

Teachers also frequently mentioned examples of sharing of materials and ideas (30%).

> ...sharing gear, films. People seemed more generous than usual.
>
> Fourth Grade Teacher

> ..just a general talking to each other about the curriculum in the teachers' room.
>
> Second Grade Teacher

> ...sharing any and all knowledge.
>
> Third Grade Teacher

Other examples were team teaching, support given by trained teachers for neophytes, and support given by the principal.

> [We were] teaming classrooms together of different age levels.
>
> Fifth Grade Teacher

> Teachers who attended the workshop (Project OCEAN training) were understanding of those who had no knowledge or information--[they] supported us.
>
> Kindergarten Teacher

> The principal pitched in to set up centers in the cafeteria for squid dissection, etc.
>
> Fifth Grade Teacher

Teachers were also asked whether there were any feature(s) of Project OCEAN that might foster cooperation. Most teachers (85%) responded to this question. Of those, 32% mentioned the need to share materials, ideas and field trips, 16% cited group planning and organizing, an equal number mentioned the newness and familiarity of the project, 12% referred to the common instructional theme, and a few to the fact that Project OCEAN was a whole-school activity, or that there were common goals and common concerns. Several teachers thought the excitement and enthusiasm generated by the project promoted cooperation. Below are some examples of

answers to the question, "What features, if any, of Project OCEAN do you think might contribute to cooperation among teachers?"

> A multitude of needed information and materials forces cooperation to guarantee a successful week.
>
> First Grade Teacher

> Sharing builds cooperation.--Sharing is an integral part of Project OCEAN.
>
> First Grade Teacher

> Sharing ideas and working together...on the various lessons and activities.
>
> Third Grade Teacher

> Common theme...lots of new materials to share.
>
> First Grade Teacher

> The activities and curriculum did lend themselves to cross-grade grouping and heterogeneous grouping.
>
> First/Second Grade Teacher

> School-wide activities such as squid dissection.
>
> Sixth Grade Teacher

> More release time outside of class day to work cooperatively.
>
> Kindergarten-First Grade Teacher

Discussion

What is it about Project OCEAN that might have led to increased collegiality among participating teachers? New curriculum generally forces teachers to collaborate on some level, but our teachers report that the effects of this project were exceptional. It appears that Project OCEAN, through its design features and philosophy, created conditions conducive to teachers' working as colleagues. According to the criteria of collegiality offered by Little (1982) and Anderson (1982), Project OCEAN-trained teachers as a group claim to be very collegial. They speak of shared planning, shared materials preparation and joint instruction. During Oceans Week, whole faculties participated in this kind of sharing. Furthermore, thanks to their own administrations, they were given the time and resources to support these activities (Nelson,

1986; Wildman & Niles, 1987).

Features of the model of student instruction, that would seem to promote collegiality are (1) school-wide participation (including all students), (2) interdisciplinary instruction, and (3) total school-day immersion in marine science. The school-wide nature of the project meant that teachers had something in common to discuss, and though materials were largely provided, they needed to be shared in a way not usually necessary. Since all teachers were teaching about oceans at once, they had to coordinate sharing of books, films, slides, etc. School-wide participation also led to cross-classroom activities and all-school projects during Oceans Week. The interdisciplinary approach meant that teachers could choose to teach marine science through subject areas they felt competent in, perhaps allowing more to participate comfortably. This effect seemed to stimulate sharing of expertise.

The total school-day immersion lent an intensity to the shared experience. Because marine science topics and activities (including assemblies, speakers, field trips) consumed each entire day for a week, teachers were "in the same boat:" they all had to cope with the challenge of developing a full curriculum around the marine science theme, and (as with sharing materials) they had to coordinate carefully so that all students got to participate in special activities.

Features of the teacher training model which appear to contribute to growth of collegiality are (1) modeling by experts of the activities and techniques being described, (2) extensive opportunity for rehearsal of instructional activities, and (3) the requirement that Project OCEAN trained teachers return to their own schools and conduct in-service training. The modeling of instruction by Project OCEAN staff established the practice of mutual observation and discussion of teaching practices. These experts were not only teaching content and explicitly demonstrating exemplary teaching methods, they were establishing a norm of collegiality within the training group, which could extend to the group of teachers. Several participants noted the teamwork of the Project OCEAN staff. Said one,

> I watched closely how the Oceans staff coordinated their efforts and how well they worked as a team as they worked toward a mutual goal. I took notes as often as possible on their teaching styles, as I sensed early on that they were a special team and a great model of teaching styles and approaches...

The rehearsal of instructional activities by the participating teachers was public, but the mutual observation was a natural by-product rather than the artificial "bureaucratic ritual or attack" it can be felt to be when it is part of a performance evaluation (Bird and Little, 1986, p.494). It is undoubtedly easier to practice in front of peers who are relative strangers, coached by experts who have no axes to grind than it is to expose oneself to worksite colleagues or administrators (Joyce & Showers, 1983).

The third aspect of the training model, teachers' leading in-service training in their own schools, has importance from several standpoints. First, the trained teachers were making their own teaching skill public to their fellow teachers -- not an easy thing to do. The post-training survey revealed that conducting in-service workshops was the job teachers felt

least confident about (e.g., compared to teaching marine science concepts to their own students). Nevertheless, most of them did so, to the gratitude of their colleagues. A first-grade teacher said,

> The enthusiasm of the staff [trained by Project OCEAN] was tremendous. Their enthusiasm rubbed off on all of us.

Second, the norm of cooperation and acceptance typified by the original Institute training seems to have been transferred to the school setting. In the post Oceans Weeks interviews, inexperienced teachers frequently mentioned feeling supported by the trained teachers. Third, the in-service sessions and other meetings at which trained teachers "inducted" new teachers into the Project OCEAN approach simply gave teachers an opportunity to meet; since principals had made a commitment to participation in Project OCEAN, they had to allocate time for preparation.

Particular features of the training and instructional models of Project OCEAN appear to have made this (at least temporary) modification in school culture possible. It is not clear which features are required to bring about the collegial behaviors observed. Independently, the training model and instructional model reflect accepted standards of practice, but a change in collegiality is not a normally predicted outcome of training or instructional change alone. It may be that the collegial effect is dependent on <u>both</u> high-quality training and school-wide participation in an intense instructional experience.

It is widely accepted that collegiality of the staff of a school is a primary condition for school improvement. What can be done to promote collegiality where it does not already exist? In some sense, the culture (the patterns of behavior that reflect underlying beliefs and values) of a school has to change in order for collegiality to arise where it has not flourished. Since school culture is usually by nature stable and unmotivated to change, cultural change may need to be stimulated from the outside (Ost, 1989). One answer to this need is the development of partnerships between schools and other institutions, such as universities and museums. Extended interchange among members of these different cultures could be expected to modify school culture. However characteristics of the interchange that would result in innovation change have yet to be identified. One way these institutions can participate in promoting cultural change that leads to increased collegiality is to offer teachers high-quality training followed by an intense, school-wide instructional experience.

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